

Abstract Of the Disclosure

A plate-frame heat exchange reactor having a serial cross-flow geometry. This is accomplished by designing a plate-frame heat exchanger wherein the flow of feed gas in one cell of the reactor flows perpendicular to the flow of burner exhaust within the next adjacent cell. The improved reactor increases the Reynold's number of the flows as compared with a massively parallel design to improve heat transfer and reactant mixing characteristics, thereby reducing reactor size by half or more. The serial cross-flow arrangement allows for constructing reactors where feed gas addition is possible at many distinct points along the serial flow in order to control hot spots or other undesirable chemical reactions. The new arrangement also greatly reduces manifolding of the flows and reduces the distinct components of the reactor.